To date, sepsis remains a diagnostic and management challenge worldwide and Malaysia is not immune from this global burden. As reported in the MOH Health Facts 2012, certain infectious and parasitic disease (which includes septicemia) ranks as the 3rd leading cause of death afflicting the country in 2011.

In view of septicemia, physicians are often beset with several diagnostic conundrums. Are the patients’ manifestations due to bacteremia? Are the blood culture results contaminants or viable organisms? The good news is that with diagnostic tools such as the BD BACTEC™ premium resin media and automated monitoring systems, physicians can now substantiate a diagnosis more certainly, allowing more cost-effective care and ultimately better patient outcomes.

The CLSI guidelines recommend the collection of at least two blood culture sets per septic episode for adult patients. This number is based on several factors which are discussed further in this article.

Optimized Recovery

In recent studies conducted with the BACTEC 9000 automated blood culture system, it has been shown that the collection of higher volumes of blood in multiple blood culture sets significantly increases the chances of detecting episodes of bacteremia and fungemia. In fact, more blood cultures may also be required for patients already on empirical antibiotic therapy and detection of low level bacteremia. This practice ensures that adequate volumes of blood is cultured routinely as opposed to a single set draw which poses high risk of contamination and have a profound effect on clinical judgments and patient survival.
Cockerill et al.\textsuperscript{3} in his paper entitled ‘Optimal Testing Parameters for Blood Cultures’ have shown that collect two or more blood culture sets, each comprising two bottles per set, over a 24-hour period will detect over 96\% of bacteraemia episodes, compared to a detection rate of only 65\% with the first blood culture set.

**Contamination or Real Pathogen?**

Contamination is a pressing issue, often introduced during collection process. If specimen collectors practice poor collection technique, they can introduce organisms into blood culture bottles, giving rise to falsely elevated levels. This produces a significant level of false-positive results that mislead physicians into thinking that patients have potentially life-threatening bacteraemias when, in fact, they do not.

More often than not, this puts physicians in quandary. They must decide whether to ignore a result that is life-threatening, or to consume valuable hospital resources fighting an infection that might not exist. Posed with this paradox, many choose the conservative approach: administer antibiotics and monitor the patient with more tests. The end results are increasing antimicrobial resistance and treatment costs.

One key way to address this is to distinguish between true bacteraemia and a contaminant by multiple blood culture sets taken from different anatomical sites. The proportion of positive cultures is scrutinized and looking at the number of bottles that the same organism is isolated in helps to conclude the bloodstream infection.

For instance, around 80\% of all contaminated cultures are attributed to coagulase-negative staphylococci (CoNS)\textsuperscript{6}; However in some cases, it may not be a definite contaminant. Hence, a single blood culture that yields CoNS would not suffice for diagnosis as it may represent contamination or clinically important infection. Conversely, if two blood culture sets were obtained in sequence by separate venipuncture yields the same isolate, then it is high likely that the isolate represents ‘true’ bacteraemia and contamination can be ruled out.

Such instance makes it increasingly clear that at least two blood culture sets must be performed for each septic episode in order to maximize the diagnostic utility of blood cultures, which is at a fraction of cost as opposed to increased length of hospital stay and extra patient care if diagnosis were delayed and treatment were wrongly prescribed.
In the current economic standing, where budgets are restricted and cost savings are critical, it is vital to reflect on the complete picture to accurately diagnose and initiate treatment of septicemia early. The benefit of performing blood cultures cannot be overemphasized – blood cultures cost very little yet their outcomes drive the decision-making process. And so, implementation of best practice in blood culture – collecting the optimum number of blood culture sets thereby justifies the additional initial outlay to ultimately achieve maximum efficiency and overall cost savings.

The message is clear:

Taking multiple blood culture sets, can you afford not to?

References: